B.I.T., Sindri
Ist Mid Semester Examination-2019
B.Tech – II Semester (Except C.S.E.)
Subject- Mathematics-II

Time Duration: 1 Hour 30 Minutes **Max. Marks:** 20
INSTRUCTIONS: (i) Attempt any five questions.
(ii) Marks are indicated in the right hand margin.

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1. Answer any four questions. Choose the correct option. [1×4]

(a) The value of triple integral $\int_0^1 \int_{y^2}^1 \int_0^{1-x} x\,dxdydz$ is

(i) $\frac{4}{35}$ (ii) $-\frac{5}{38}$ (iii) $\frac{35}{4}$ (iv) $-\frac{17}{35}$.

(b) If S is any closed surface enclosing a volume V and $\vec{F} = x\hat{i} + 2y\hat{j} + 3z\hat{k}$ then the value of the integral $\iint_S \vec{F}.\hat{n}dS$ is

(i) $3V$ (ii) $6V$ (iii) $2V$ (iv) 6S.

(c) The integral $\int_0^1 \int_0^{\sqrt{1-x^2}} (x+y)\,dydx$ after changing the order of integration

(i) $\int_0^2 \int_0^{\sqrt{1-y^2}} (x+y)\,dxdy$ (ii) $\int_0^1 \int_0^{\sqrt{1-y^2}} (x+y)\,dxdy$ (iii) $\int_0^1 \int_0^{\sqrt{1+y^2}} (x+y)\,dxdy$ (iv) $\int_0^{-1} \int_0^{\sqrt{1-y^2}} (x+y)\,dxdy$.

(d) The differential equation $\left(\frac{dx}{dy}\right)^2 + 5y^{1/3} = x$ is

(i) linear of degree 3 (ii) non-linear of order 1 and degree 6 (iii) non-linear of order 1 and degree 2 (iv) none of these.

(e) The differential equation $\left(x + x^8 + ay^2\right)dx + \left(y^8 - y + bxy\right)dy = 0$ is exact if

(i) $b = 2a$ (ii) $a = b$ (iii) $a \neq 2b$ (iv) $a = 1, b = 3$.

(f) Solution of $p = \sin\left(y - xp\right)$ is, where $p = \frac{dy}{dx}$

(i) $y = \frac{c}{x} + \sin^{-1} c$ (ii) $y = cx + \sin c$ (iii) $y = cx + \sin^{-1} c$ (iv) $y = x + \sin^{-1} c$.

P.T.O.

2. Solve $x\frac{dy}{dx}+y=y^2x^3\cos x.$ [4]

3. Solve $y+px=p^2x^4$, where $p=\frac{dy}{dx}$. [4]

4. Evaluate $\iint xy(x+y)\,dx\,dy$ over the area between $y=x^2$ and $y=x$. [4]

5. Find the position of center of gravity of semi-circular lamina of radius a if its density varies as the square of the distance from the diameter. [4]

6. Verify Green's theorem in the $xy-$plane for $\int_C\left[\left(2xy-x^2\right)dx+\left(x^2+y^2\right)dy\right]$, where C is the boundary of the region enclosed by $y=x^2$ and $y^2=x$. [4]

7. Solve $\left[y\left(1+\frac{1}{x}\right)\cos y\right]dx+(x+\log x)(\cos y-y\sin y)\,dy=0.$ [4]